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Assistant Director



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THE PARAFFIN METHOD OF GRAFTING

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FURTHER REFLECTIONS OF AN ORCHID-HUNTER

How we should welcome a "Flora of Manhattan," of the year 1609! We can picture to ourselves the appearance of the island, when Hendrick Hudson and his companions first looked on it; but we very much want something more substantial than fancies or impressions. We want records and herbaria. It is not till some generations later that we begin to get them in America. In the days of Hudson and his adventurous rivals, exploring expeditions were not equipped for scientific pioneering. We are quite sure that there was no botanist on the "Half-Moon" when she came slowly up the bay. Our curiosity is piqued, but not satisfied by the pleasant statement of Washington Irving,¹ when he tells us that some of the abundant trees were "loaded with a verdant burthen of clambering vines, bowing their branches to the earth, that was covered with flowers." He specifies "the dogwood, the sumach and the wild brier, whose scarlet berries and white blossoms glowed brightly among the deep greens of the surrounding foliage." All of these beauties linger still within a few miles of the place where Hudson landed. The day was the third of September; so we can credit the dogwood berries and perhaps some late flowers of a *Rubus*; but we should like to know what were those other vines that, with tropical intensity, bowed the lofty trees; and we desire even more strongly to know

¹ Knickerbocker's New York, p. 90. Putnam ed. 1863.

the names of the scores of other plants that crowded the wooded hills of Manhattan on that distant day.

We shall never know ; records are lacking ; wishes and guesses do not take their place. The scientific imagination looks forward not backward ; it develops theories and plans, not legends. These reflections are prompted by the conviction that our regrettable lack of definite knowledge of the plant life of Manhattan three hundred years ago should be a warning against present neglect. Throughout an area many times as great as the twenty-two square miles of Manhattan Island, species are disappearing or are waiting to be discovered. Unless botanists of the present generation are unremittingly active during the next few years, they will fail to secure some evidences of plant life and distribution which would be invaluable to their successors. In spite of all that has been done, much remains unattempted. No one can predict how important some facts, as yet undiscovered, may be. In spite of the admirable and intelligent, and profitable specializing in fields of botanical science that till recently had not been entered, it remains true that the base of all our investigations is the plants themselves ; questions of ecology, association, soils, distribution, economic values, though immeasurably important, are secondary ; the facts, of the presence and prevalence of species, come first. The structure of all botanical knowledge, whose apex reaches high, rests on quadrats !

These reflections are concerned with the orchid-flora and constitute a plea for prompt advance in thorough acquaintance with that, especially in the Eastern States. Similar considerations apply to all plant families, but not to all with quite the same urgency. For our native orchids are usually harder to find than most species of flowering plants and are also more exposed to spoliation, at the hands of over-enthusiastic collectors, or, in the vicinity of many cities, by the vandalism of children and excursionists. Hence the need for prompt and diligent search before some species are exterminated, and in order that others may be discovered, or at least detected in new places ; so as to provide the material for thorough study, comparison, inference and record.

This plea for prompt and vigorous activity in extended investigation of our native orchids may be urged on three grounds.

1. First, the fact that the orchid flora is not yet fully known. We have been beguiled into unwarranted complacency by the present extent of our knowledge, which is both interesting and stimulating. We do know a good deal and some of this information has been very thoroughly exploited. Some traditional localities for certain rarer species have been visited too often by collectors more enthusiastic than prudent. Some commoner species have been reported from so many places in different States that we have failed to think whether we could draw from herbaria any sound conclusions as to the actual distribution, county by county, of the sporadically collected plants.

Some recent results of intensive exploration emphasize by comparison both what may be done and what has not been done. In the vicinity of Squam Lake in central New Hampshire thirty-three species of orchids have been found during a period of about ten years, chiefly by a few of the members of a boys' camp, in a tract of one hundred square miles. During the same period the writer has found the same number of species and with few exceptions, the same species, in the town of Fairlee, Orange County, Vermont, in nearly the same latitude as Squam Lake and about thirty-five miles distant, in an area of less than eight square miles. A few weeks of occasional exploration last summer in Ulster County, New York, chiefly in an unpromising region, resulted in the collecting of fourteen species. Nor are the numerical results the only interesting facts in these explorations. Though the work was done by amateurs, in the Squam Lake region large colonies of *Triphora trianthophora* were found,¹ including in some years thousands of blossoming plants, and valuable data were obtained in regard to the growth and the periodicity of this little-known species. In Ulster county new stations were found for *Triphora*, *Corallorhiza odontorhiza* and *Peramium ophioides*. In Fairlee *Cypripedium arietinum* was found in great abundance on a dry, rocky hillside; *Cypripedium*

¹ *Rhodora* 22: 53. 1920.

hirsutum, Mill., *Malaxis monophylla* and *Lysiella*, well established in certain cold bogs, and *Pogonia ophioglossoides* locally very abundant. Many of the more interesting species were not found in the first or the second year of investigation; almost every year was crowned with fresh discoveries. It was not till the eighth summer in Fairlee that *Ophrys cordata* was found. *O. convallarioides* had not been observed until the year before, though both of these species had been anticipated and searched for.

Moreover, the numbers found in Fairlee and about Squam Lake have a relative significance, in addition to their own value and the identity of the species involved. Thirty-three is just about half the number of species listed in Gray or in Britton and Brown. It is greater than the number reported from West Virginia and only two less than those enumerated in Miss Blair's carefully compiled Orchids of Ohio. Only thirty-nine species are reported from Alabama and forty from Tennessee. Such numerical comparisons have no exact scientific value. They take no account of the inevitable differences of growth in different regions or of the probable effect of unknown factors. They do, however, say plainly that intensive exploration yields unexpected and valuable results. They do provide incentive for such definite, painstaking study.

The need of this specialized and prolonged study is emphasized, for our native orchids, by reflecting on some reasons why our orchid flora is, apparently, less fully known than, for example, such genera as *Viola* or *Carex* or families like the Mints, the Roses or the Arums. Four reasons may be mentioned, all stimulating to the zealous collector and student; the brief anthesis of many species, the inconspicuousness of many, a prevalent sparsity of occurrence and the secluded, not to say almost inaccessible, spots in which many species prefer to live.

The ordinary record in the Manuals, as: June, July; May-July, sufficiently accurate for its purpose, obscures the fact that in any one locality the flowering season is much shorter than is indicated by these terms. Of our nearly seventy species in the eastern and middle States, scarcely twelve continue to bloom, in

any one locality, during thirty days, and not more than five or six, chiefly *Habenarias*, in the inclusive sense, for more than one month. For the great majority, the anthesis is brief, often not more than a few days, though it is modified by the presence or absence of the needed insect visitors. Notably in *Cypripedium arietinum* and *Isotria verticillata* the flowers develop and wither within about seven days. *Malaxis unifolia* develops slowly and continuously during the whole summer, but *M. monophylla* has the opposite habit; one might pass by its home unsuspectingly in early July and a week later find the tender scape well-grown and the minute flowers open. This species is probably not so rare as it is reported to be; it hides. Of course many species can be detected quite as readily in fruit as in flower, some, as *Liparis Loeselii*, more readily; but very many plants do not reach the fruiting stage in a given year, and, in the majority of our eastern species, the plant is likely to be less readily discerned after the flowers wither, because of the decay and disappearance of its leaf or the luxuriance of surrounding vegetation or the blending of the tones of color as the summer draws toward its close. Particularly of *Aplectrum* is it true that the infrequent visitor to some regions where it grows might walk over its hiding-place during ten months of the year and not suspect its presence. In some more southern localities its wrinkled green leaves, where it is abundant, are conspicuous through the winter; but throughout most of our region neither the brownish-red leaf-tips in September nor the graying leaves in May are likely to attract any but an experienced hunter. And if there is no fertilization the brown scape withers promptly. Then during three months or more, neither leaf nor scape gives notice of the sleeping corm.

Allusion has been made to the minute blossoms of *Malaxis*. The whole plant too, is small, as is the case also with all of our species of *Ophrys*. There are other causes of inconspicuousness in very many of our orchids. Some grow in dark places, many in the midst of a rank surrounding herbage. Some imitate or at least adopt the prevailing shade of green that is fashionable in their neighborhood. It is difficult often to detect *Liparis*

Locsclii or *Blephariglottis lacera* or *Perularia* or *Malaxis unifolia*, even when one knows they are almost within reach. With several species only the blossom betrays their presence to other than a keen and practiced eye. Some of the taller species grow frequently among grasses and sedges. There are only a few species whose habit is to thrive conspicuously in open places or to form large colonies that attract attention by their size.

It is true that some of our native orchids are noticeable at a distance, because of the size or the beauty of their flowers or because of something unusual in their aspect. No one can pass within range of the bog that harbors the big *Cypripedium* without seeing its splendid flowers, and the coral roots stand out distinctly from the surrounding greens. *Arethusa*, though of short stature, is conspicuously beautiful in bogs, in the spring; if it bloomed in midsummer it would be difficult to detect. The same is true of *Calypso* and even of *Orchis*; though there is a peculiar texture in the leaves and a uniqueness in the whole aspect of any orchid that catches the eye of an enthusiast.

One reason why even the more conspicuous species are not reported more frequently is that they grow in remote or secluded places, difficult to approach or to explore. When these stations are known, they are eagerly visited, but to discover such sanctuaries of beauty requires enthusiasm and knowledge and persistence beyond the usual amateur equipment. There is little doubt that some species accounted rare or local might be found in many places if they were sought for diligently. Some recent discoveries in New York State emphasize this reasonable expectation and indicate clearly the need of exploring even unpromising localities.

Moreover a single visit or a few visits at long intervals will not surely exhaust the possibilities of a region or even of a comparatively small tract. There is with many species—perhaps with all, though it hasn't yet been proved against them—an uncertain periodicity, which baffles the explorer and compels frequent and intensive scrutiny. In Johnson County, Iowa, *Coralorhiza odontorhiza* was common in a certain deep wood in the

year 1896; before and since it has been rare in the same place. This instance is exemplary, not unique. It could be paralleled by many observers if they had made records. Sometimes the periodicity is only in regard to blossoming, as in *Peramium pubescens*, of which the writer knows one colony, containing more than two hundred plants, in which seldom as many as ten are found in bloom in any year, though all seem to be thriving. Some of the tenderer species are affected doubtless by transient climate differences. A severe winter or a late frost may prevent flowering even when it doesn't kill. Some maturity of years is apparently necessary before the first blossoming. The vigor or readiness to bloom which would normally be attained in three or four years may be delayed by unfavorable conditions. We can guess, more or less reasonably, various explanations of the sporadicity of occurrence of many species; but the fact is plainly evident and is another reason why all orchids are not yet fully known. All of these causes, the brief anthesis of some, the inconspicuousness of many in flower or leaf, habitats not easily discovered or approached, a baffling periodicity, combine to present a challenge to orchid-hunters. Those who wish to become really acquainted must take pains and use their eyes and persevere.

2. A second ground for the plea here urged is the rather surprising fact that few if any of our great herbaria are well supplied with abundant specimens for record and future study. Care and diligence are now shown in designating type specimens and in identifying those of an earlier generation. Diagrams of localities, maps indicating distribution, photographs, often including habitat conditions, are multiplying. Card-catalogues in some institutions are prepared to serve both the present and the future. But specimens are too few. Card catalogues emphasize this lack, betray this paucity. Some eager student, fifty years from now, could get, from most of our present collections, no more satisfying answers to his questions about distribution, with its frequent implications of specific differences, than we have now to our queries about the prehistoric Flora of Manhattan!

We have a good deal of material but not enough; a scientific induction needs *all* available facts. Records without justifying specimens are baffling. Specimens from a restricted area or a less than adequate territory may not puzzle but are likely to mislead. Sometimes they are disappointing, as when recently an inquirer came from an adjacent State to one of our larger herbaria to get information about the anthesis of *Blephariglottis fimbriata* and *B. psycodes*, and learned that his private collection furnished a fuller answer than he could get from the very meager possessions of the visited herbarium.

Ten years ago Mr. Oakes Ames published his monograph of *Habenaria*. The stations listed are derived from study of this genus in twenty-two herbaria, including those at Cambridge and Washington, that of the Missouri Botanical Garden and that of the Geological Survey of Canada. In five of these collections, all of the twenty species recognized in Gray's Manual are represented, and all but one or two in four more. It is not surprising that in the rest, about four sevenths of the whole number, chiefly private or local collections, comparatively few species are preserved. It is noteworthy, however, that even in the National Herbarium and the Gray Herbarium, with few exceptions, no more than twenty-five localities and fewer states are represented in the specimens of widely distributed species. The herbarium in Ottawa is better furnished, in the representation of some northern species of this genus, than any in the United States. Additions have been made, of course, to the great collections, during the ten years since, but at the time of the publication of Mr. Ames's monograph, a species so widely distributed and readily discerned as *H. bracteata* (Willd.) R. Br. is represented in the National Herbarium by specimens from thirteen states only, and in the Gray Herbarium from nine; Maine does not appear at Washington, nor Pennsylvania at Cambridge, nor Wisconsin in either collection; assuming that the enumeration in the monograph was complete when it was made. In the writer's own collection, gathered chiefly during the last five years, *Liparis Loeselii* is more widely represented than in one

herbarium that contains more than 100,000 species. The explanation of such regrettable *lacunae* is, of course, easy to find. Not much careful study has been given to the distribution of the Orchidaceae and exploring expeditions covering large areas have usually been conducted rapidly, with only brief pauses and with scant opportunity for scrutinizing search. Where the reverse has been true, as in some Canadian surveys, a much greater number of stations is represented, in a few herbaria. Speaking generally, but in the language of facts, no one herbarium now tells the whole story of distribution, even as it is now known, for any species of *Habenaria*. Not at the Smithsonian nor at Cambridge nor at the New York Botanical Garden can one study the distribution of our native orchids with all available, not to say all desirable, material. There is enough in several places to encourage the desire for more; but in no one herbarium nor in all together is there adequate representation of the orchid flora of all the states of this country and Canada. All who love our native orchids must wake up to this condition and take pains to improve it before it is too late.

3. For, thirdly, our orchids are disappearing, at least in the Atlantic States. Some have always been labeled "rare" because we haven't hunted for them, but nearly all are rapidly becoming scarce. Never flourishing in our territory with tropical exuberance and sensitive, apparently, to slight changes of environment and association, they are disappearing before many enemies.. "Civilization" of course is deadly to them. We are not surprised that the swarming population has driven them from Manhattan Island, where, even fifty years ago, at least seven species were growing though not flourishing. We are, however, surprised and disappointed that in the neighboring Borough of Richmond not more than one or two survive of the twenty and more species that have been found within thirty years. It both enhances and embitters our regret to know that vandalism, rather than the natural processes of reclaiming land for human use, is the chief cause of the disappearance on Staten Island of *Triphora* and *Tipularia* and the fringed *Habenarias*. In places remote from

great cities the process of extermination goes on ; trees are felled, swamps are drained, thickets are cut down ; golf succeeds grazing ; the nooks and dells and shady ravines and springy hillsides disappear. Nature, too, takes a hand in the changes. The salt tides come inland beyond their wont, as in Southern New Jersey ; a killing frost penetrates deep or lingers long in many a northern bog ; the tender roots of some cherished species are poisoned or shriveled ; the station is lost, the colony vanishes. In undiscovered ways, too, natural causes, without waiting to be charted or directed, join with human agencies in hastening the disappearance of our orchids. When we know more about mycorrhiza and the chemistry of soils we may be able to follow these processes more closely ; but that enhanced knowledge will hardly reconcile us to the patent fact that species once prevalent become rare and disappear in some localities, without rash collecting or rude despoiling. The writer could go almost to the spot where he collected *Arethusa* in a thriving colony, near Rutland, Vermont, some thirty years ago, but it cannot be found there now, any more than in Fairlee, from which it is reported more recently. When we come upon one lonesome, rather depauperate, plant, and find none of its kindred within many rods or in the same town, we know that we are witnesses of the vanishing of a species. Then when we read, of some rare *Habenaria*, "hundreds of acres of it," "very common in moist fields," "our most common species, sometimes four feet high," we wonder whether other species for which we search now often in vain were once so abundant and luxuriant. For the home of that "most common" species is now a cultivated farm ; if you go there you find grass and corn instead of *H. peramoena*. Mr. William Beebe has epitomized many such occurrences : "To every succeeding generation the country near at hand becomes less like wild planet land and more like a museum . . . and only those who love nature enough to make sacrifices of time and effort win through to the few wild places left in far distant corners of the earth." He was thinking of birds chiefly and of the protection (!) afforded by trespass-signs, but his words are fatally true of

most of our native orchids, which shrink before the breath of change and perish in the face of civilization.

Surely there are grounds for our plea. We do not know our orchid flora thoroughly well; what we do know is not adequately represented even in the great herbaria; species are diminishing and disappearing fast. Yet there are rewards for searching; the known stations for *Ophrys australis* in New York State have been multiplying within the last few years; in Cape May County, New Jersey, *Habenaria nivea*, has been found recently and *H. integra* has been rediscovered. Always, fortune beckons and leads to unexpected finds. Pleasure as well as obligation is implicit in the plea for prompt and persistent prosecution of orchid study.

The obligation however seems imperative and clear. Though species disappear, the memory of them must persist and records must support and authenticate it. Not only in our newer dependencies, or in Florida or Texas, where luxuriance invites and frequent discoveries stimulate the explorer, but in the older states, the search for both species and stations should be prosecuted with untiring perseverance. In some states the orchid flora is probably very limited but we want to *know* its extent. In the oldest states scores of counties are unexplored; we want to know their testimony, even though it prove to be only corroborative. We want for the whole country such analyzed information about the periods of growth as is given in Taylor's Flora of the Vicinity of New York. We want certified observations in regard to the insect-helpers of every species. We want, for each genus, at least, such careful study of underground growth as Mr. Lownes has made of *Triphora*. We need "nation-wide" comparison of the dates and duration of anthesis, of identical and related species; for temperature and latitude seem not to tell the whole of this story. Revision is needed of some statements in our Manuals in regard to measurements, time of flowering, rarity, distribution. Most of these requirements imply the work of special enthusiasts, local observers, patiently doing intensive study. Institutions and curators of herbaria can help by

encouraging such personal investigations, as well as by prosecuting generous plans for exploration and exchanging. Local herborizing can best be done by resident amateurs, for no locality tells all its secrets to the tourist; each month shows a different orchid flora and every year has probable surprises in store. Both local and general exploration are stimulated by accurate record and study of what has already been attained. Catalogues of state and local floras, maps and other pictorial helps stimulate effort. Apparent discrepancies clamor for the fuller knowledge that will reconcile them. Lack of information rouses both curiosity and energy. In proportion as we learn more we wish to know the rest. Need stirs us to effort, effort rewards and feeds desire. The gracious circle completes itself again and again.

These reflections will seem to some to look forward to a vague and very distant future. As a matter of fact that future must be near or it will never be reached. We must prosecute our inquiries, collect our facts soon if at all. "Now or never" is literally true of orchid exploration in many places; and "Now" means not more than a few years. As the kind of development in Manhattan is steadily pushing not only the early families but all householders off the island, so advancing civilization is steadily obliterating our native plants. We must hand on descriptions, records, photographs, specimens of the orchids. We must gather our material promptly. We must be busier than the destructive forces. We must do all we can every year.

"The search for lost opportunity is endless" and unrewarded; the search for some undiscovered orchid, though never finished, is a perennial joy.

HERBERT M. DENSLOW.

GRAFTING WITH THE AID OF PARAFFIN¹

(WITH PLATE 250)

The grafting of nut trees has been particularly difficult as a rule for two or three reasons, apparently. Repair of wounds by callus takes place more slowly with some members of the nut-tree group than it does with many drupes or in the rose family. The Juglandaceae, in particular, carry a good deal of sugar in their sap and it is apparently a pabulum for various microbic parasites which exert a destructive influence upon new cell formation. There is a tendency toward drying out of the graft before repair takes place in many of the hard-wood trees and in the hard-wood group nice adjustment between the cut surface of the scion and that of the stock is difficult because of the rigidity of the wood.

Various obstacles are overcome by the method of applying melted paraffin not only to the wound in the stock but also to the entire scion, buds and all. This prevents escape of moisture from the scion and maintains a sap tension corresponding to that of the stock in the presence of negative and positive sap pressures. Furthermore the melted paraffin fills all of the interstices which would otherwise be occupied by decomposing sap.

The form of graft must be adapted to conditions of the stock. For example a branch of stock of approximately the same diameter as that of the scion may be split in the common cleft-graft way. On the other hand if the branch to receive the scion is somewhat larger in diameter than the latter the cleft is made at a point which will allow the cambium layers of the stock and scion to be brought neatly together. Better than the cleft graft is the "bark-slot" method. A slot of the width of the scion is made in the bark of a branch or trunk of almost any size and the scion is inserted into this slot in the bark. Wrap-

¹ Abstract of a lecture delivered at the Garden on May 29, 1920. The accompanying photographs were taken at the time by Mr. R. Reid.

pings of raffia will suffice for small cleft grafts but for the bark slot the Spanish windlass is preferable. This consists of a strong cord tied loosely about the stock where the graft is inserted and this loose cord is then wound up with a skewer acting as a twister. When the cord has been wound tightly enough the long arm of the twister is fixed in the bark of the stock with a two-point tack to prevent unwinding.

This form of fixation of the scion has several advantages. It holds the scion very snugly against the stock. It allows perfect covering of all wound surfaces with melted paraffin and also increased growth of the stock during the summer without need for readjustment of the fixation device. The adjustment is automatic. As the stock increases in diameter during the season's growth it unwinds the Spanish windlass on the stock side with a corresponding winding up of the cord toward the twister side.

When preparing stocks for grafting purposes it is well to cut them back during the dormant season and paint the cut surfaces or cover them with melted paraffin. While this is the preferable way for preparing stocks we find, however, that tops may be cut back at almost any time during the summer after the cessation of the free flow of sap and grafting may be done at the same time. Theoretically the plant physiologist knows very well that such a procedure would shock the tree, but so far as I can determine this shock is not a very serious one.

After the stock has been grafted it is important to break off shoots which start in advance of the starting of the scion buds. This must be continued until the scion buds have made several inches of growth. After that time stock shoots may be allowed to develop in order to help in furnishing pabulum for the root for the next year's growth. At the end of the third year all stock shoots should be removed permanently and only the growth of the graft permitted, provided the graft growth is large enough to balance the root.

Scions are preferably cut during the dormant season and put into cold storage or otherwise preserved until the time for their employment, but by means of the paraffin method it has been

possible for me to do a good deal of direct grafting experimentally, cutting scions directly from a growing tree and inserting them into a stock tree. When we employ the direct method of grafting, all new growth of the year is cut away from the scion and we depend upon older latent buds in the scion. The time for nut-tree grafting is preferably after the leaves are fairly well out and the free flow of sap is less than it is earlier in the season. Practically, I have successfully grafted hickories from March until the last week in July and find that the customary grafting season can now be extended from five weeks to nearly five months. The methods which are employed for grafting nut trees may also be used for other fruit trees.

This brief outline covers only the essential points in the process. More elaborate details will, however, be included in a small book to be published at an early date.

ROBERT T. MORRIS, M.D.

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EXPLANATION OF PLATE 250

FIG. 1. Inserting a hickory scion in the bark of a hickory stock. The slot is the same length and width as the portion of the scion to be inserted.

FIG. 2. A bark slot at the end of a cut branch. A bit of flat wood is pressed upon the tongue of bark in order to insure better pressure from the Spanish windlass.

FIG. 3. Spanish windlass applied and melted paraffin being brushed over the entire field of work, including all of the scion.

FIG. 4. Fixation of the scion by the use of raffia instead of the Spanish windlass.

FIG. 5. An ordinary side-cleft graft. Melted paraffin is being applied as stated under Fig. 3.

FIG. 6. A hickory demonstration stock showing ordinary cleft-grafting with raffia fixation and bark-slot grafting with Spanish windlass.

NOTES, NEWS AND COMMENT

Bulletin 39, with 94 pages of text, was issued June 30, 1920. It contains the annual reports of the Director-in-Chief and other officers of the Garden for the year 1919.

About seventy pupils from Curtis High School, Staten Island, spent the afternoon of June 25 at the Garden examining the museum collections and the plantations under the guidance of members of the staff.

The library has recently been the recipient of a book entitled "Wild flowers drawn and colored from nature" by Mrs. C. M. Badger, with an introduction by Mrs. L. H. Sigourney. This handsome work, in quarto, with 22 hand-colored plates, is the gift of Mrs. Fannie Griscom Parsons.

Meteorology for June. The total precipitation for the month was 4.04 inches. The maximum temperatures were as follows: 91° on the 3d, 93° on the 11th and 15th, 88° on the 26th and 90° on the 28th. The minimum temperatures were 50° on the 5th, 6th and 10th, 52° on the 19th and 58° on the 23d.

Dr. N. L. Britton, accompanied by Mrs. Britton, sailed for Europe August 7 on the Philadelphia. During his stay abroad he will visit various botanical institutions of Great Britain, France, and Switzerland in the interests of the Garden, particularly in furtherance of the rapidly developing investigation of the flora of northern South America.

Bulletin 38, the fourth edition of the guide to the grounds, buildings and collections of the Garden, appeared June 24, 1920. It contains 125 pages of descriptive text, a general plan of the Garden, and 28 full page illustrations. Several important features have been developed since the publication of the last guide, particularly in the area of over 140 acres added to the Garden early in 1915.

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